Discount Rates for Time Versus Dates:
The Sensitivity of Discounting to Time-Interval Description

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Seven experiments examined the impact of time-interval descriptions on consumers' discount rates. Consumers consistently discounted the future more sharply (e.g., demanding more money to delay a windfall for a fixed amount of time) when time intervals were described with an extent of time instead of with dates. This pattern held across a variety of contexts, including both gains and losses. Potential mechanisms and implications are discussed.

Innumerable transactions force consumers to consider how aversive waiting will be. Decisions in which consumer patience plays a role range from the relatively mundane (e.g., deciding whether to pay for expedited shipping) to the much more important (e.g., deciding whether to forego current consumption to be able to finance retirement or a child's education). Beyond the obvious relevance to personal consumption decisions, people's willingness to sacrifice short-term benefits for longer-term gains has consequences for managerial decisions (Mowen and Mowen 1991), health care decisions (Chapman 2003), and public policy decisions (Loewenstein and Thaler 1989), to name just a few relevant domains.

The study of consumer patience is part of a larger research tradition of examining intertemporal choices, that is, decisions that involve tradeoffs between costs incurred at one time and benefits received at another (Frederick, Loewenstein, and O'Donoghue 2003). Much intertemporal choice research has focused on the phenomenon of positive *temporal discounting*: people perceive a gain to be received in the future as worth somewhat less than an equivalent gain received in the present. Though actual discounting behavior may diverge from the clean predictions of early normative accounts (e.g., Samuelson 1937), substantial regularities in consumer discounting have been documented (see, e.g., Benzion, Rapoport, & Yagil 1989; Kirby and Herrnstein 1995; Read 2001; Thaler 1981), leading to the formulation of quite sophisticated theories that model and predict intertemporal decisions (see Loewenstein, Read, and Baumeister 2003, for review).

The current paper identifies a heretofore neglected consideration that substantially affects temporal discounting. In seven experiments, discounting is shown to be impacted by the manner in which time intervals are described, with descriptions that focus on the extent of time (e.g., number of months) promoting more discounting of the future than descriptions that focus on

interval boundaries (e.g., dates). A brief review of relevant temporal discounting research will place these experiments into the appropriate theoretical context.

DISCOUNTING THE FUTURE

Much current discounting research can trace its intellectual roots to an early formal model initially proposed by Samuelson (1937). Notably, the model posited a great deal of consistency in discounting behavior, such that the degree to which an individual discounted the future would be consistent across time, amounts, and situations. Thus, if $100 received in one year was seen as equivalent to $75 received today, $100 received in two years would be equivalent to $75 received in one year and $1000 received in one year would equate to $750 received today.

Though Samuelson (1937) himself doubted the model's appropriateness as either a perfect descriptor of choice or even as a normative standard against which behavior should be judged, his model nonetheless became quite influential, in part because it so cleanly modeled intertemporal preferences (Frederick, Loewenstein, and O'Donoghue 2003). Nevertheless, the past two decades have witnessed a surge in attempts to more accurately characterize temporal discounting and intertemporal choice, and the observed behaviors have been less consistent than Samuelson's model predicted. In actuality, consumers are sensitive to changes—and even nuances—in the decision situation that early models ignored. These patterns of effects are reviewed in detail elsewhere (see Chapman 2003; Frederick, Loewenstein, and O'Donoghue 2003; Loewenstein and Prelec 1992; Loewenstein and Thaler 1989; Prelec and Loewenstein 1991), but several robust anomalies merit brief discussions here.

First, imagine people deciding how much money they would require in the future to postpone immediate receipt of a lottery prize. Instead of discounting the future consistently

across amounts, people in such situations are relatively more impatient, discounting the future to a greater degree, for small amounts than for large. Thus, people winning $15 demanded 400% of the original value (or $60) to wait for a year, but those winning $3000 only needed 125% of the starting amount (or $4000) to wait the same year (Thaler 1981; see also Benzion, Rapoport, and Yagil 1989; Green, Fristoe, and Myerson 1994). Models of consumer discounting, therefore, must incorporate this sensitivity of discount rate to magnitude.

Another recurring issue is that consumers exhibit different discount rates for gains than for losses. Consumers demand quite a bit of compensation to defer a gain into the future but are willing to pay only a comparatively small amount to be allowed to defer a loss of equal magnitude. Again, consumers equated a current $15 gain with $60 received in one year, but they were only willing to raise a $15 debt to $20 for the privilege of deferring payment for that same amount of time (Thaler 1981; see also Benzion, Rapoport, and Yagil 1989). Future outcomes that are equivalent in absolute value but disparate in sign are viewed quite differently, with a future gain discounted much more dramatically than a future loss.

Furthermore, people are relatively more impatient for short time intervals than for long. For example, those postponing a $250 prize demanded $300 total to wait three months, but demanded only $350 to wait a full year. Thus, they requested a $50 premium to wait three months, but needed only an extra $50 to wait four times that long (Thaler 1981; see also Benzion, Rapoport, and Yagil 1989). Furthermore, consumer discount rates are also sensitive to *when* rewards will be received: consumers are more willing to wait for a large "late" reward—instead of accepting a small "soon" reward—as the receipt of the small reward moves further and further into the future. This happens even though the distance between the two rewards remains fixed (Green, Fristoe, and Myerson 1994; Kirby and Herrnstein 1995; Roelofsma and Keren

1995). Consumer discount rates are thus sensitive to, among other things, the magnitude and sign of the amount in question, the length of the delay, and the date of receipt, even though none of these factors was considered consequential by early economic models.

LOGICALLY EQUIVALENT SITUATIONS

In the examples above, consumers displayed shifting discount rates as key variables of the situation changed. Arguably more interesting, however, are cases in which intertemporal preferences fluctuate even when the situation's parameters remain the same. Consider, for example, the following (Loewenstein and Prelec 1993): When given a "simple" choice between dinner at a well-liked French restaurant on Friday in one month versus a dinner at that same restaurant on Friday in two months, most (80%) people opted for the sooner dinner. However, others were given this "elaborated" choice:

a) Dinner at a French restaurant on Friday in one month, and dinner at home on Friday in two months.

b) Dinner at home on Friday in one month, and dinner at a French restaurant on Friday in two months.

Under this latter description, most participants now preferred to defer the French dinner, selecting option "b," presumably because they wanted an improving sequence of meals. Note, however, that since "dinner at home" was the most likely event for participants in any situation, the simple and elaborated descriptions really presented the same choice to participants. The elaborated description merely highlighted meal sequencing in a way that the simple did not (Loewenstein and Prelec 1993). Thus, consumers' willingness to wait for a reward (the fancy French dinner) was affected by the description of the choice, even though the choice itself (French dinner in one month vs. two) remained constant.

In other examples, researchers have again held the objective situation constant, but have successfully manipulated reference points to affect preferences. For example, Loewenstein (1988) found that consumers expecting to be able to use a gift certificate immediately demanded $23.85 to be willing to delay use of the gift certificate for six months. On the other hand, those who expected to receive a gift certificate that they could use in six months were willing to pay only $10.17 to be able to use it immediately. Thus, the "price" of six months was much greater when the six-month wait was unexpected (cf. Benzion, Rapoport, and Yagil 1989; see Loewenstein and Prelec 1992 for other reference-point manipulations).

Consumer time preferences may also be affected by how they are elicited. For example, in keeping with classic "preference reversals" (Lichtenstein and Slovic 1971), consumers faced with a sooner short-term gain ($1600 in 1.5 years) versus a later long-term gain ($2500 in five years) chose the sooner gain 74% of the time. But, when asked the smallest immediate amount they would exchange for the sooner and later gains, only 25% priced the sooner gain over the later, thus demonstrating less impatience under pricing than under choice (Tversky, Slovic, and Kahneman 1990; see Ahlbrecht and Weber 1997 for another elicitation effect).

The current paper considers another manipulation that holds the objective parameters of the decision constant. Rather than changing elicitation procedures or even manipulating consumer reference points, the current studies manipulate a much smaller element of the choice description to affect consumer time preferences, thereby highlighting the malleability of consumer discount rates. Specifically, the studies reported below take advantage of the fact that time intervals can be described in terms of extent (e.g., the amount of time, such as the number of months) or in terms of interval boundaries (e.g., dates).

TIME-INTERVAL DESCRIPTIONS

What, if any, influence might a manipulation of time-interval description have? The body of research on systematic manipulations of interval description is relatively small, but there are suggestions that such description manipulations could be quite consequential.

First, although consumers are obviously aware that a time interval can be described in multiple ways, consumers nonetheless exhibit regularities in when they use one type of interval descriptor as opposed to another. For example, people's likelihood of using a date-based descriptor increases as the described time interval increases (Golding, Magliano, and Baggett 1995; Golding, Magliano, and Hemphill 1992). Thus, though people recognize interval descriptors' logical equivalence, description types may not be psychologically interchangeable.

More related to the current purposes, some research has manipulated the descriptions that participants are asked to use when estimating time intervals. LeBoeuf and Shafir (2004), for example, asked participants to estimate various time intervals, either in terms of a date ("On what date will you next do your laundry") or in terms of temporal extent ("How many days will it be until you next do your laundry"). For certain future intervals (e.g., the time required to complete future plans), estimates were reliably shorter when participants were focused on extent than when they were focused on dates. Participants did not think they needed as much time, for example, to do their laundry when they thought of time in terms of extent. Teigen (1987) found a similar effect with estimates of ambiguously-defined past time intervals (e.g., estimating events such as, "the beginning of modern psychology"); those generating dates gave responses that were farther in the past than those generating extents.

The finding that tasks were predicted to be finished sooner when extent-based estimates were given suggests that consumers may view an extent-based interval as presenting more opportunities for task completion than an equivalent date-based interval. Though there may be

many explanations for such a finding, one potential explanation seems particularly germane to the topic of temporal discounting: perhaps extent-based intervals seem to give relatively more opportunities for task completion because the sheer length of such intervals is much more focal than is the length of equivalent date-based intervals.

That is, when consumers consider an interval demarcated in terms of a date, that date may seem a relatively abstract point in time, and the interval's length may not loom large. In contrast, when that same interval is described in terms of extent, the amount of time in the interval is, by definition, highlighted. Attention is called explicitly to the interval's length; consumers may thus contemplate the time that will pass during the interval much more viscerally than they would under a date-based description. This could lead consumers to give higher estimates about what can be accomplished in an extent-based interval than a date-based one (cf. LeBoeuf and Shafir, 2004). Furthermore, and crucially for research on temporal discounting, consumers may be more troubled by waiting—and may perhaps even feel they are waiting longer—if they are asked to wait the course of an interval described by extent than one described by dates. This perception of a longer or more troubling wait under an extent-based description could lead participants to, for example, demand more compensation for delaying a gain than they would with a date-based interval, thus making discount rates higher under the former than latter description type.

Thus, this paper's central proposition is that consumers asked to consider an interval in terms of extent of time will discount the future more sharply than will consumers considering that same interval in terms of dates. In other words, extent-based intervals will render consumers more impatient to receive future gains and more willing to pay to defer current losses. Surprisingly, this proposition has not before been directly considered in the literature. Though

researchers acknowledge that one could study discounting by querying participants either in terms of extent or in terms of dates, the presumption seems to be that the two will generate equivalent discount rates (Frederick, Loewenstein, and O'Donoghue 2003).

That said, one study conducted for other purposes lends tentative, though indirect, support for the current proposition: Read (2001, see also 2003) conducted several experiments, changing interval description from dates (e.g., "from February 2000 to February 2002", Experiment 1) to extent (e.g., "24 months," Experiment 2) across experiments. Since this change was not of interest for his paper, Read did not examine the effects of the description changes. Although cross-experiment comparisons are tenuous, a close examination of Read's (2001) results hints at support for the proposition above: consumers seem to have discounted the future more in the experiments in which intervals were described with extents instead of dates. This paper goes beyond that hint to test this proposition directly and thoroughly.

The current proposition, if supported, is consistent with countless studies, some reviewed above, that have shown consumer discount rates to be malleable. And yet, testing this proposition could highlight this malleability even more strikingly than before. Manipulating interval description presents no new information to participants, does nothing to change the amounts of money under consideration, and, naturally, changes nothing about how long participants must actually wait. If participants were affected by such a slight change, this would be akin to a framing effect, inasmuch as logically equivalent descriptions of a decision situation would give rise to discrepant preferences (e.g., Tversky and Kahneman 1981).

The susceptibility of temporal discounting to such framing manipulations would lend insight into the psychology of time perception, highlighting the instability of consumer preferences in intertemporal situations and emphasizing the degree to which very clean economic

models of consumer discounting (e.g., Samuelson, 1937) inadequately describe actual behavior. Furthermore, such effects would present yet another factor that must be incorporated by current descriptive theories of discounting (e.g., Read 2003). As such, the proposition of increased discounting under extent-based descriptors is examined in the following seven experiments.

EXPERIMENT 1

In keeping with the above logic, Experiment 1 assessed whether interval description could impact consumer discount rates. Discounting was measured by asking consumers to specify a "future" amount of money (received after a specified time interval) that would be equivalent to a fixed amount available today. If consumers are indeed more likely to discount the future when time intervals are described in terms of extent than in terms of date, they should demand more compensation for waiting during an extent-format than a date-format interval. This leads to hypothesis 1.

H1: Consumers asked to specify the least amount of money needed to delay a currently-available gain will require more money when the delay is discussed in terms of extent than in terms of dates.

EXPERIMENT 1A: METHOD

Participants. Forty-two undergraduates at a private northeastern university participated in partial fulfillment of a course requirement.

Materials. Three scenarios asked participants to imagine choosing between receiving a prize of specified value now and receiving a prize of a greater (but unspecified) value after a given time interval had passed. The prizes and time intervals were $50—five months, $100—eight months, and $500—two months. (Throughout this paper, dollar amounts were chosen to represent a noticeable gain for our undergraduate participants without substantially changing

their wealth.) The intervals were either described by extent or by the dates that marked their endpoints. In all cases, the date-format intervals spanned the same amount of time as the extent-format intervals. For example, the "extent" version of the $500 scenario read:

> Imagine you have won $500. You are offered the following deal: You can either have the money today or you can get *more* money by waiting two months to collect your prize. How much would the prize have to be worth two months from now for you to agree to wait until then to claim the prize?

The "date" version of the same scenario, on the other hand, read as follows (for participants completing the study on January 20th):

> Imagine you have won $500. You are offered the following deal: You can either have the money today or you can get *more* money by waiting until March 20th to collect your prize. How much would the prize have to be worth in March for you to agree to wait until then to claim the prize?

Interval description was manipulated fully between participants, but each participant received each of the three scenarios. The order of the scenarios was counterbalanced.

Procedure. Participants completed this task among several unrelated tasks in the laboratory. The three scenarios were presented on the same page, which was embedded in a larger packet. Packets were randomly distributed to ensure random assignment to condition.

EXPERIMENT 1A: RESULTS AND DISCUSSION

Table 1 presents the average levels of compensation demanded. As shown in the table, the results support hypothesis 1. For each item, participants requested reliably more compensation when the interval was described in terms of extent of time, as compared to date ($50: $t(40) = 2.27$, $p = .03$; $100: $t(40) = 2.25$, $p = .03$; $500: $t(39) = 2.60$, $p = .01$; one

participant skipped the $500 question). The responses of each participant who contributed valid data for all three items were averaged across items to create a composite score representing the average amount of compensation the participant demanded. Participants in the extent-format condition demanded reliably more compensation ($676.35) than did those in the date-format condition ($324.33, $t(39) = 2.37$, $p = .02$).

Insert table 1 about here.

Thus, participants demanded strikingly more compensation to endure a delay when the delay was described by the amount of time to be waited than when it was described by dates. Before addressing other conceptual issues, it seemed desirable to replicate this pattern of results. Experiment 1b allowed this and also allowed for a slight methodological change. In experiment 1a, the date-based description initially referred to a specific date (e.g., "by waiting until March 20th"), but the next sentence asked only about a month (e.g., "…worth in March"). Though it was intended that participants would report the amount required to wait until the specific date, participants may have only reported the amount needed to wait until the beginning of the month in question. Thus, some participants in the date-format condition could have been requesting compensation for a shorter interval than those in the extent-format condition. This seems unlikely to be the source of the observed effects, but experiment 1b clarifies this phrasing.

EXPERIMENT 1B: METHOD

Participants. Three hundred fifty-six undergraduates at a private northeastern university participated. One hundred eight volunteered to participate in class, whereas 250 participated for payment. Results were not affected by whether participants were compensated.

Materials. Four scenarios asked participants to imagine, as before, a choice between a prize of a given amount now and a prize of unspecified greater value after a given time interval. To explore the generality of the effect, the prizes and time intervals were changed slightly from experiment 1a, to $50—three months, $100—eight months, $500—ten months, and $600—four months. As before, the intervals were either described by extent or by date. The wording of the scenarios was identical to that of experiment 1a, with the exception that the last sentence of the date-format scenarios was changed to repeat the specific date mentioned earlier in the scenario (e.g., "How much would the prize have to be worth on March 20th"). This change should have ensured that participants in both conditions were considering intervals of equal length. Interval description was manipulated fully between participants; each participant received one scenario.

Procedure. Volunteering participants responded only to this task. Paid participants completed the task among several unrelated tasks in a larger questionnaire packet. In all cases, questionnaires were randomly distributed to ensure random assignment to condition.

EXPERIMENT 1B: RESULTS AND DISCUSSION

Table 1 presents the results. The pattern found in experiment 1a was replicated: more compensation was requested when the intervals were described in terms of extent of time than in terms of dates. Though the effect of format was not consistently reliable ($50: $t(64) = .74$, $p = .46$; $100: $t(101) = 2.06$, $p = .04$; $500: $t(67) = 1.57$, $p = .12$; $600: $t(116) = 1.68$, $p = .10$), a 2 (interval description) x 4 (item) ANOVA examined the effect of the description manipulation across items. A main effect of interval description emerged, indicating that, on average, extent-based descriptions led to reliably greater compensation requests ($746.21) than did date-based descriptions ($517.08, $F(1, 348) = 6.19$, $p = .01$; the only other reliable effect in the ANOVA was a main effect of item, stemming from the items' different starting values).

Again, hypothesis 1 is supported. Participants demanded more compensation for deferring a gain for a given time interval when the interval's extent was highlighted than when the interval was described by dates. This finding is consistent with the proposition that consumers discount the future to a greater degree when the distance to a future date is described, rather then when that future date itself is mentioned. Experiment 2 examines another way in which an extent focus could provoke such greater impatience.

EXPERIMENT 2

Experiment 2 further explored the effects of interval description on discount rates. The structure of the task in experiment 2 was similar to experiment 1: consumers had to equate an immediate prize with a greater prize received in the future. However, in experiment 2, the dollar amounts of both prizes were fixed, and consumers were required to specify (either in terms of extent or date) the time interval that would make them indifferent between receiving the smaller prize immediately and the larger prize after the time had passed. Greater discounting under extent-based intervals would mean that waiting for a payoff seems rather unattractive when consumers consider intervals in terms of extent. Since the amounts of money under consideration are held constant, a consumer's only recourse would be to set a relatively short time interval when dealing with extent-based intervals. This leads to hypothesis 2.

H2: Consumers specifying how long they would wait to wait to receive a larger future prize (in lieu of a smaller immediate prize) will specify shorter intervals when specifying those intervals in terms of extents rather than in terms of dates.

METHOD

Participants. Two hundred fifty-three undergraduates at a private northeastern university participated for payment.

Materials. Three scenarios asked participants to imagine a choice between a smaller prize now and a greater prize in the future. The smaller-larger prize pairs were: $50-$260, $100-$490, and $500-$750. Participants were asked to indicate how long they would be willing to wait to receive the larger prize. Some were asked to do this by specifying an extent of time:

> Imagine you've won $50, and you are offered the following deal: You can either receive $50 right now, or you can wait a certain amount of time, and receive $260. For how long would you be willing to wait so you could get the greater amount of money? Please give an amount of time.

These instructions were followed by a line on which participants could write their responses. Others were asked to specify the date on which the time interval would end:

> Imagine you've won $50, and you are offered the following deal: You can either receive $50 right now, or you can wait until a certain future date, and receive $260. Until what date would you be willing to wait so you could get the greater amount of money? Please give a specific date.

These instructions were followed by a line presenting spaces for the month, day, and year. Requested interval description was manipulated fully between participants, and each participant received each of the three scenarios, with order counterbalanced.

Procedure. Each scenario appeared on its own page; these pages appeared consecutively and were combined with several unrelated tasks into a larger questionnaire packet. The packets were randomly distributed to ensure random assignment to condition.

RESULTS AND DISCUSSION

Responses were converted into days. For date-format responses, the number of days between the date on which participants responded and the dates they specified were calculated.

For extent-format responses, some responded with a number of days, but others responded with weeks (multiplied by seven to convert), months (multiplied by 30), or years (multiplied by 365). (Multiplying months instead by 31 does not affect the results.) Table 2 presents the results.

Insert table 2 about here.

The data reported in table 2 were positively skewed. As such, a logarithmic transformation was applied, and the analyses below were conducted on the transformed data. (The main conclusions do not differ if the analyses are conducted on the raw data.) For each scenario, participants were willing to wait a reliably shorter amount of time when they reported waiting times in terms of extent than when giving dates ($50-$260: $t(251) = 2.85$, $p = .005$; $100-$490: $t(249) = 3.24$, $p < .001$; $500-$750: $t(249) = 3.18$, $p = .002$; changes in degrees of freedom reflect omitted or illegible responses). A composite score indexing each participant's average willingness to wait was computed for each participant who specified a valid data point in each scenario. Those specifying dates were willing to wait reliably longer, on average (1024.71 days), than those specifying an extent of time (541.58 days, $t(248) = 3.38$, $p < .001$).

As hypothesis 2 suggests, consumers are willing to wait longer to receive a fixed amount of money when they express the to-be-waited time in terms of dates instead of extent. This corroborates experiment 1's results as well as the more general idea that consumer impatience increases, and discount rates are higher, when future intervals are thought of in terms of extent instead of dates. Note also that experiment 2, by requiring consumers to formulate a different sort of response from experiment 1, helps to establish that experiment 1's findings were not an experimental artifact stemming from some type of response bias. Still, one might argue that

experiments 1 and 2 constitute similar situations, requiring participants to make rather abstract tradeoffs with which they have relatively little experience and which lack ecological validity. Experiment 3 addresses these issues and expands the generalizability of the current results.

EXPERIMENT 3

Experiments 1 and 2 presented evidence consistent with higher discount rates under extent-based than date-based descriptions. That said, the preceding stimuli were rather limited in scope, focusing as they did on windfalls and lotteries. Such situations may not be representative of the decisions faced regularly by consumers; indeed, consumers may treat windfall income differently from regular income (e.g., Arkes et al. 1994; Bodkin 1959). Though there is no reason to think that the striking effects of interval description would disappear were the context not windfalls, it is prudent to generalize the above effects to more typical consumption situations.

A frequently-encountered tradeoff between immediate and delayed consumption arises in investing, which essentially amounts to foregoing a small amount available immediately in the hopes that it will be larger at some future time. Though many investments entail an element of uncertainty, some—such as savings accounts and certificates of deposit (CDs)—do not. As such, in experiment 3, we asked participants to consider CDs that required a fixed initial investment and that would mature after a fixed time interval. If the findings of experiments 1 and 2 generalize, one would expect that consumers would see waiting until a given maturation date to be more onerous—and thus deserving of a better payoff—when time intervals are described in terms of extent instead of date. This leads to hypothesis 3.

H3: Consumers asked to specify how much an investment must deliver at maturity will specify more money when the time until maturation is described in terms of extent of time remaining until maturity rather than the date of maturity.

METHOD

Participants. Two hundred forty undergraduates at a public southeastern university participated for extra course credit.

Materials and procedure. Participants each read about six investment opportunities, all described as CDs. The initial instructions explained the investments, stating that a specified initial amount (the principal) would be invested for a specified interval, and that interest would then be earned so that a larger amount would be guaranteed at maturity. Participants were asked to indicate, for each CD, "the amount of money you would need to receive at maturity (principal + interest) for you to consider the CD an attractive investment." Then the CDs were presented, with interval description (date vs. extent) manipulated wholly between participants. For example, in the date-format condition, the first CD was described in the following terms (for those completing the task on April 12th): "Amount invested today: $650; CD matures: June 12, 2003." In the extent-format condition, the same CD was described as "Amount invested today: $650; CD matures: in two months." The other investments and waiting times are displayed in table 3. The six CDs all appeared on the same page, with presentation order counterbalanced. Participants, randomly assigned to condition, completed this task as one of several in the lab.

RESULTS AND DISCUSSION

The results are shown in table 3. For each CD, several (from one to four) participants indicated amounts that were less than the initial investment (e.g., they requested $25 at maturity for a CD with a $50 initial investment), suggesting that these participants did not carefully read the instructions to specify the *total* amount required at maturity. Such participants were excluded from the analysis of any items on which they made such an error. The data were again positively skewed, and so a logarithmic transformation was applied to participants' responses.

Though the raw data are reported in table 3, all analyses were conducted on the transformed data. (The main conclusions do not differ if the analyses are conducted on the raw data.)

Insert table 3 about here.

For all but one item, responses were in the predicted direction: consumers demanded that the CD be worth more at maturity in the extent-format, as compared to the date-format, condition. As before, the average payoff that each participant requested was computed. (Participants were excluded from this average if, at any point, they responded with a value lower than the corresponding CD's stated initial investment.) On average, those who considered the time until maturity in terms of extent requested reliably more money at maturity ($691.63) than did those who read about that interval in terms of a date ($617.15, $t(228) = 2.98$, $p = .003$).

These results confirm hypothesis 3: when investing money for a fixed amount of time, consumers demand a greater payoff when the investment period is described in terms of extent than in terms of a final date. This study provides more evidence—with more ecologically valid and potentially important stimuli—that discount rates fluctuate even when a situation's objective parameter's are fixed: after all, nothing about the investments changed when the interval description was modified from extent to date. Despite this, consumer perceptions changed so as to make them discount the future more sharply under the former description than the latter. Experiment 4 extends these findings to another type of tradeoff consumers may need to make.

EXPERIMENT 4

Three experiments have thus far yielded results consistent with the proposition that consumers discount the future more when they think about time in terms of extent than in terms

of dates. Extent-based descriptions increase the amount of money that consumers demand for waiting (or investing) for a particular time interval; they also decrease the amount of time that consumers are willing to wait for a given payoff. Whereas the previous experiments examined tradeoffs between "now" and "later," experiment 4 examines whether interval description might also affect consumer preferences even when no award is immediately available. Often, when investing time or money into a project, people must plan whether they will "harvest" a smaller gain at some future time, or whether they will wait for an even later, larger gain. These tradeoffs permeate people's daily lives: consider, for example, the student deciding whether to invest a little bit of time and settle for a "C", or to invest much more time to earn an "A."

Such tradeoffs loom particularly large in decisions about saving for the future, as some small gains may be available quickly whereas larger gains may not materialize for years. To instantiate these sorts of choices, the current study presented participants with investments that had two options: a smaller, shorter-term payoff, or a larger, longer-term payoff. The descriptions of the investment terms were manipulated so that the same investments were described either with dates or with extents of time. In contrast to the prior studies, there was no possibility of receiving any payoff immediately, and consumers had no need to calculate their desired payoffs or waiting times. Consumers simply were asked to choose the option that seemed more appealing. This design, coupled with the proposition that extent-based descriptions prompt more discounting, leads to hypothesis 4.

H4: When investing a particular amount and choosing between a short-term smaller payoff and a long-term larger payoff, consumers will be less likely to wait for the larger payoff when the time until the payoffs is described by extents rather than by dates.

METHOD

Participants. One hundred thirty-three undergraduates at a public southeastern university participated for extra course credit.

Materials and procedure. Participants each read about six investments. In each case, they were told they were investing the initial amount now, and that they had a choice as to the investment length and payoff. Investment-length description (extent or date) was manipulated fully between participants. For example, one choice featured an initial investment of $200. Those in the extent-format condition chose between the following two options:

Option A: Pays you $280 (total) in eight months

Option B: Pays you $400 (total) in sixteen months

For those in the date-format condition, "in eight months" was replaced with "on December 12, 2003" (e.g., a date exactly eight months in the future); "sixteen months" was similarly converted to a date. The parameters of all investments are listed in table 4. The six investments all appeared on the same page with presentation order counterbalanced. Participants, randomly assigned to condition, completed this task as one of several in the lab.

RESULTS AND DISCUSSION

As shown in table 4, for each of the investments, the longer-term investment was more preferred when the time until the receipt of the payoffs was described with dates.

Insert table 4 about here.

To assess each participant's overall willingness to wait for the larger payoff, participants were assigned a "0" for each selection of the short-term option and a "1" for each selection of the long-term option. Each participant's score was averaged across items, so that a 1.0 would

indicate that the participant always opted for the longer-term option with a 0.0 indicating the opposite. Scores were reliably greater, indicating more patience and less discounting, in the date-format condition than the extent-format condition (.66 v .51, $t(131) = 3.35$, $p = .001$).

These results confirm hypothesis 4: when participants are deciding whether to wait for an extra payoff, they are more likely to conclude that the money merits waiting when the wait is described in terms of the dates bracketing the wait (as opposed to in terms of the time to be waited). This finding augments the previous experiments, showing that increased discounting under extent-based descriptions manifests in choices between discrete options as well as when the soonest possible payoff occurs months in the future. Experiment 5 examines whether these effects of interval description apply to losses as well as gains.

EXPERIMENT 5

All of the above studies have examined the degree to which consumers discount future gains, showing that consumers tend to discount those gains more (e.g., feel they are worth less in present dollars) when they are focused on the amount of time that will pass until the gain instead of on the day on which the gain will be received. As noted in the introduction, however, consumers discount gains quite differently from losses, with losses being discounted much less sharply than are gains. For example, though people may demand quite a bit of compensation to defer a gain, they are reluctant to pay a similarly large premium to defer a loss. Given this disinclination to discount losses, it is not certain that the effects explored in the present paper will extend to transactions that are coded as losses.

Experiment 5 investigated these issues. Consumers responded to scenarios that asked them how much they would be willing to pay to defer various debts for specific time intervals, with the interval descriptions manipulated to either refer to extents of time or to specific dates. If

people are truly reluctant to discount losses, one might expect the interval-description manipulation to have relatively little effect on discount rates—people may discount the future very little when the interval is described as a date, and changing the description to the extent of time may have no effect. However, this seems unlikely. After all, though people are reluctant to pay to defer losses, they are still willing to pay more to defer a loss for one year than they are to defer it for three months (Thaler 1981). Along similar lines, people may be sensitive to interval-description changes, such as those examined here, that differentially call attention to the amount of time in the deferral interval. Given that extent-based descriptions explicitly mention an interval's length, and given the results of experiments 1 through 4, consumers may be more likely to discount the impact of a future loss when the amount of time until that future loss is highlighted. Hypothesis 5 naturally follows.

> **H5:** When asked how much money they are willing to pay to defer a loss into the future for a fixed amount of time, people will be willing to pay more when the time interval is described in terms of extent of time than in terms of dates.

METHOD

Participants. Eighty-six undergraduates at a public southeastern university participated for extra course credit.

Materials and procedure. Participants each read three scenarios (see Appendix) that presented them with an opportunity to defer a debt for a certain amount of time: "IRS" dealt with taxes; "parking" dealt with traffic tickets; and "credit" dealt with a bill for furniture and appliances. Participants were told the initial amount of each debt. As before, the description of the deferral intervals was manipulated fully between participants, highlighting either the extent of time of the deferral (e.g., eight months) or the date on which the deferral would end (e.g., a

date eight months in the future). After each scenario, participants indicated the total amount they would be willing to pay post-deferral so that they did not have to pay anything immediately. The three scenarios all appeared on the same page, but presentation order was counterbalanced. Participants, randomly assigned to condition, completed this task as one of several in the lab.

RESULTS AND DISCUSSION

As in experiment 3, some participants did not fully read the instructions. Two (for IRS) and three (for parking and credit) participants specified post-deferral amounts that were smaller than the initial bill or fine. Participants were excluded from the analysis of any item on which they made this sort of error. Furthermore, the data were again positively skewed, and so a logarithmic transformation was applied to participants' responses. The raw means are reported below, but all analyses were conducted on the transformed data. (The main conclusions do not differ if the analyses are conducted on the raw data.)

For each scenario, responses were in the predicted direction. When asked about deferring $300 in parking tickets, those for whom the interval was described in terms of extent were willing to pay $352.73, whereas those for whom it was described in terms of dates were only willing to pay $324.00, $t(81) = 3.09$, $p = .002$. Those deferring a $1200 furniture bill were willing to pay $1365.02 under extent-format instructions, but only $1314.76 with a date format, $t(81) = 2.09$, $p = .04$. Finally, those deferring a $100 IRS bill were willing to pay $135.57 in the extent-format, but only $124.83 in the date-format, condition, $t(82) = 1.85$, $p = .07$. As in prior studies, each participant's responses were averaged across the three scenarios; overall, those in the extent-format condition were willing to pay reliably more for the privilege of deferring ($619.22) than were those facing the date format ($587.87, $t(80) = 2.80$, $p = .006$). (As in

experiment 3, participants were excluded from this average if *any* of their responses for a question was lower than the initial bill or fine.)

These results confirm hypothesis 5: even though consumers are normally quite reluctant to pay a premium to defer fines, the premium that they pay can be increased by highlighting the amount of time in the deferral interval instead of the date marking the interval's end. Thus, $300 today seems equivalent to just over $350 in five months' time, but seems to be worth just less than $325 on the date that is five months from the present. This finding is consistent with the preceding experiments, and with the idea that consumers discount the future more sharply when extent-based descriptors are used. Though this paper's main aim is to isolate this effect and demonstrate its generality, the remaining experiments pursue potential mechanisms of this effect.

EXPERIMENT 6

Thus far, we have seen that time intervals considered in terms of extent evoke quite different reactions from those considered in terms of dates, with the former prompting more discounting of the future than the latter. One plausible explanation for this effect, suggested in the introduction, is that extent-based formulations call attention to the amount of time passing and simply make a time interval feel longer (and a wait feel more onerous) than do logically equivalent, but psychologically unequal, date-based versions. However, another phenomenon—subadditivity (Read 2001; 2003)—could be contributing to the current effects.

Subadditivity in discounting can be shown by manipulating how the discount rate for a particular interval is elicited. For example, to assess a discount rate for a 24-month interval, an individual can either be asked about the entire interval (e.g., February 2005 to February 2007), or can be asked about three successive eight-month intervals (e.g., February 2005 to October 2005; October 2005 to June 2006; June 2006 to February 2007; cf. Read 2001). Discount rates are in

fact sensitive to the number of components into which the interval is divided. In particular, people show more monetary discounting over the 24-month interval when it is broken into three smaller intervals than when it is considered as a whole (Read 2001). More generally, it seems that subdividing an interval into its constituent parts may lead to greater discounting (less patience for pending gains) than does presenting the interval as a whole.

One could argue that subadditivity is contributing to the current effects: that is, perhaps those who consider the distance between January 15 and June 15 see the interval as one unbroken stretch of time, whereas those who consider the same interval as "five months" view it as five discrete intervals, and they consider their responses interval-by-interval. If that is the case, subadditivity would indeed predict more discounting (less patience) under the extent-based description. However, note that the current extent/ date manipulation is rather different from Read's (2001) manipulation, in that Read explicitly asked participants to make judgments for each subinterval, whereas the current manipulation simply describes the interval in a way that highlights the existence of the subintervals. Thus, were one to argue for a role of subadditivity in the current effects, one would need to posit that the mere mention of a number of months is enough to prompt month-by-month discounting. This goes beyond Read's (2001, 2003) claims.

Still, the subadditivity explanation merits consideration. If the increased discounting under an extent-based description is indeed driven by participants considering the time to be waited subinterval-by-subinterval, then one might expect to see even greater discounting when the extent-based description highlights even smaller subintervals for participants. As such, the current study entails a replication of experiment 4, in which participants chose between a smaller amount of money at a near future time and a larger amount of money available later. As before, intervals were described in terms of date or in terms of extent. However, in addition to the

previous month-based descriptors, a new extent-based condition was added that described the time intervals in terms of number of days. Such day-format descriptions divide the interval into even more subintervals than do month-format intervals, so if the current effects are driven by subadditivity, one would expect to see even more discounting in the day-format condition than in the month-format condition (since discounting should increase with the number of subintervals). This leads to hypothesis 6.

> **H6:** When investing a particular amount and choosing between a short-term small payoff and a long-term large payoff, consumers will be less likely to wait for the large payoff when the time until the payoffs is framed in terms of days as opposed to months, and will be most likely to wait when the time is framed in terms of dates.

However, if the current effects are not driven solely by subadditivity, but if instead an extent-based framing—no matter how many subintervals it highlights—increases discounting by drawing attention to waiting times in a way that a date-based framing does not, one would expect the day and month formats to yield similar results and to both differ from the date format.

METHOD

Participants. Thirty-five undergraduates at a public southeastern university participated for extra course credit.

Materials and procedure. Participants each read about six investment opportunities (structurally identical to those used in experiment 4). As before, for each investment, participants were asked to imagine that they were investing the initial amount now, and that they had a choice as to the length and payoff of the investment. Time-interval description was again manipulated fully between participants, such that intervals were either described in terms of the dates of the payoffs, the extent of time in months, or the extent of time in number of days. The

six investments all appeared on the same page, with presentation order counterbalanced. Participants, randomly assigned to condition, completed this task as one of several in the lab.

RESULTS AND DISCUSSION

Table 5 presents the results. If discounting increased along with the number of subintervals highlighted, one would expect to see those in the day-format condition choosing the longer-term investment consistently less often than those in the month-format condition. However, this does not appear to be the case.

Insert table 5 about here.

The results are most parsimoniously examined by collapsing across items to create an index score that represents each participant's willingness to wait for the larger payoff. As in experiment 4, for each choice, participants were assigned a "0" if they opted for the short-term option and a "1" if they opted for the long-term option; each person's score was then averaged across items. Again, a 1.0 would indicate a consistent preference for the long-term item, whereas a 0.0 would indicate the opposite. Scores were highest under the date-format (.68), were lower under the day-format (.49), and were lowest under the month-format (.36).

Hypothesis 6 predicted that day-format scores would be lower than month-format scores, indicating more discounting in the former condition. In actuality, the reverse was non-significantly true, $t(21) = 1.24$, $p = .23$. Still, a one-way ANOVA on these scores, with format as the factor, revealed a reliable effect of format, $F(2, 32) = 4.76$, $p = .02$. A contrast indicated that scores under the day and month formats were reliably lower than those obtained under the date

format $t(32) = 4.76$, $p = .02$. Thus, the two extent-based conditions did not differ reliably from each other, but they jointly differed from the date-based condition.

These results fail to support hypothesis 6: increasing the number of subintervals that are highlighted by the extent-based description does *not* further increase the degree of discounting exhibited. This suggests that the effects obtained throughout this paper are not predicated solely on the fact that the time interval is more readily partitioned under the extent-based format than the date-based format. Instead, the current pattern of results seems more consistent with the possibility that extent-based descriptions, no matter how they partition the intervals, induce a different focus and provoke different perceptions than do date-based descriptions. Experiment 7 explores one such potentially different perception.

EXPERIMENT 7

Across six experiments, a consistent effect of time-interval description has emerged. Consumers discount the future more sharply under extent-based descriptions than date-based descriptions. This effect seems to arise independently of whether the extent is described in terms of relatively long (months) or short (days) units, and parallel effects arise when no units are provided to participants (as in experiment 2).

But why should this be the case? After all, the specifics of the choice situations do not change when interval description is manipulated; two months is just as long whether the interval is described as "two months" or as the distance between March 20th and May 20th. It seems, though, that consumers may not *perceive* the intervals to be equally long in the two cases. A time interval described in terms of extent will inevitably enumerate the number of days, months, or years that are entailed. By explicitly mentioning the amount of time to be waited, an extent-based description might render more focal and concrete the prospect of waiting, making the

interval itself seem rather long. In comparison, an interval described as the distance between two future dates (or as the distance between "now" and a future date) may seem relatively abstract. Little about a date-based description connotes the sheer length of an interval or conveys a sense of waiting. Thus, time intervals described in terms of extent may simply seem longer than do those described in terms of dates. This increase in perceived length would explain the increased discounting of the future under extent-based descriptors: the future simply seems farther away when such descriptors are used. This leads to hypothesis 7.

H7: Time intervals described in terms of extent will seem longer to participants than will those described in terms of dates.

METHOD

Participants. One hundred thirty-two undergraduates at a public southeastern university participated for extra course credit.

Materials and procedure. Participants were each asked to consider three intervals (two, five, and eight months). The intervals were either described in terms of extent or dates (manipulated between participants). For example, some participants read, "Consider an interval that starts now and ends two months from today," whereas, for others, "two months from today" was replaced with the date that fell two months from the date of the experiment.

Participants were asked to rate the perceived length of each interval as follows: a seven-point scale, with seven Xs replacing the numbers on the scale, followed each interval description. The leftmost X was labeled "seems very short"; the middle X was labeled "seems neither long nor short," and the rightmost was labeled "seems very long." Participants were asked to circle the X that best represented the interval's perceived length. (The scale did not include numbers so as to prevent participants from using a simple matching rule and rating, for example, one-

month intervals as "1" on the scale.) The three intervals all appeared on the same page, with interval order counterbalanced. Participants, randomly assigned to condition, completed this task as one of several in the lab.

RESULTS AND DISCUSSION

Responses were converted to numbers, with a "1" corresponding to the leftmost (shortest seeming) X, and a "7" corresponding to the rightmost (longest) X. Each interval indeed seemed longer when described in terms of extent than in terms of dates (two months: 3.76 vs. 2.83; five months: 5.08 vs. 4.82; eight months: 5.85 vs. 5.70), though the effect only attained reliability for the two-month interval, $t(130) = 3.69$, $p < .001$. To get a sense of the effect across items, one can average each participant's responses. On average, participants facing extent-based intervals reported that the intervals actually seemed longer than did those facing equivalent date-based intervals (4.89 vs. 4.45, $t(130) = 2.36$, $p = .02$). This difference in perceived length may explain why participants discount the future more sharply when the time interval is described in terms of extent: the future, when described in this way, actually seems farther away.

GENERAL DISCUSSION

When considering tradeoffs between money available in the present and in the future, consumers almost always discount the future, judging future dollars to be worth less than present ones. The amount of discounting exhibited, however, is not a constant. This paper demonstrates that discount rates are sensitive enough to change with slight changes in time-interval description. Confirming the paper's central proposition, across multiple domains and despite disparate elicitation procedures, consumers consistently discounted the future more sharply when time intervals were described by extents instead of dates. In experiment 1, this heightened discounting manifested as consumers demanding more money to defer a gain when the delay was

described in terms of extent instead of dates. Consistent with this, experiment 2 showed that consumers were willing to wait only half as long to receive a gain when specifying waits in terms of extents rather than dates. Relative to a date focus, an extent focus made consumers less amenable to deferring gains; the terms that sufficed to make deferral an attractive proposition under a date focus would not have sufficed for an extent focus.

Experiment 3 extended these findings to more ecologically valid decision tasks, showing that people demanded greater payoffs from investments when the investment term was described by extent. Experiment 4 examined choices between two future investment payoffs. Fewer people deemed a longer-term investment worth waiting for (despite its higher payoff) when the investments' time horizons were described by extent instead of dates. In experiment 5, similar patterns were observed for debts: people given the opportunity to pay a premium to defer a fine were willing to pay more when the deferral period was described in terms of extent than date, suggesting that a future loss seemed less burdensome when the time until the loss was characterized by extent. Essentially, the effect of interval description on discount rates was to render behavior more present-focused, and less future-oriented, when extent, and not date, described the critical time interval.

Though this paper's aim was to isolate the effect of a change in interval description, experiments 6 and 7 began to pursue questions of mechanism. Experiment 6 replicated experiment 4 while suggesting that the effects were not solely driven by extent-based descriptions highlighting multiple subintervals into which the main time interval could be divided. This casts doubt on the idea that the effects arise mainly from subadditivity of the sort shown by Read (2001). Experiment 7 provided evidence consistent with another proposition, however: extent-based descriptions may simply make time intervals seem longer than date-based

intervals, precisely because the former explicitly refer to the amount of time that one must wait. Note that all of current paper's findings are consistent with this: if extent-based intervals simply seem longer, one would naturally expect consumers to be less eager to defer gains for extent-based intervals (compared to date-based intervals) but more eager to defer losses.

Note one potential alternative explanation for the current effects. In several of the above experiments, the extent-format condition used "months" as the main interval of time (e.g., five months, two months, three months). One might argue that, since a month may seem to be a relatively long period of time, increased discounting with an extent format arose not because of something unique about *extent*-based descriptors, but because the word "months," in particular, heightened the accessibility of thoughts about long intervals. Though the current data do not completely rule out such an interpretation, note that in experiment 2, an extent-based interval still led to increased discounting even though *no* units were provided. Furthermore, in experiment 6, increased discounting relative to the date condition was observed in both extent conditions, regardless of whether they were labeled with "days" or "months" (and presumably, the word "day" would not prime thoughts of especially long time intervals). Thus, it seems unlikely that the effects arose only because of the specific descriptors used in the extent-based condition.

TIME AND DISCOUNTING

Interval descriptors. Though prior studies have not manipulated interval description to investigate discount rates, Read (2001) changed interval description across experiments, obtaining evidence that is at least directionally in line with the current results: extent-based descriptors seemingly led to more discounting than did date-based descriptors.

Furthermore, the prior literature contains results consistent with the idea that extent-based descriptors prompt perceptions of longer time intervals than do equivalent date-based

descriptors. Both LeBoeuf and Shafir (2004) and Teigen (1987) found that, when responding with extents, people gave higher estimates of how much could (or did) happen in a given time interval, relative to when responding with dates. For example, participants providing a number of days thought they would be able to do laundry, buy books, finish a paper, and so on, sooner than did those providing a date (LeBoeuf and Shafir 2004). If extent-based intervals truly seem longer than do equivalent date-based intervals, as suggested by experiment 7, this relative optimism about what can be accomplished in an extent-based interval could be explained.

Current and prior results alike help to paint a picture of the psychology of time perception, suggesting that intervals are indeed perceived quite differently depending on how they are described, with extent-based descriptions promoting a greater focus on, and a concern with, interval length. The implications of these findings are not, of course, limited to temporal discounting. For example, research has found that people tend to represent distant events at a relatively abstract level while contemplating proximal events more concretely (Trope and Liberman 2003). Consumers may, for example, agree to and anticipate a business trip when it is relatively distant (focusing on factors such as the benefits to reputation) but may dread the same trip when it looms near (contemplating lower-level features such as the drive to the airport). If manipulations of interval description affect how distant certain events seem, extent-based descriptors may prompt relatively more abstract construals of events, leading consumers to more eagerly commit to future events (e.g., concerts and vacations) or changes (e.g., moves and job transitions). Extent-based descriptors may also make future risks seem more distant and less worrisome than do date-based descriptors, with possible implications for people's willingness to incur the costs of risk-avoidance (for a related finding, see Chandran and Menon, 2004).

Discount rates. The current results also join years of research showing consumer discount rates to be more unstable, and intertemporal choice to be relatively less orderly, than early normative models posited (e.g., Samuelson, 1937). But, whereas much prior research has shown discount rates to fluctuate in the face of changes in the decision situation (e.g., changes in the amount of money or time, or changes in the sign of the dollar amount), the current work shows that even when the particulars of the decision are fixed, discount rates remain malleable. Although there have been illustrations that logically equivalent situations can lead to disparate discount rates if, for example, consumer reference points are manipulated (e.g., Loewenstein 1988; Loewenstein and Prelec 1992), the current results suggest that discount rates are malleable even when the only change is in the description of the to-be-waited interval. Representing an interval as ranging from January 4 to July 4 prompts different responses–and less discounting–than does representing it as "six months." Models that aim to accurately characterize consumer discounting behavior and intertemporal choice have already acknowledged the descriptive inadequacy of early models that suggested discount rates to be consistent across all situations (cf. Loewenstein, Read, and Baumeister 2003). Still, the current results suggest that there are a host of factors, such as interval description, that may not yet be incorporated into existing theories but that must be considered to generate accurate predictions of consumer choice.

PRACTICAL IMPLICATIONS AND CONCLUSIONS

The practical implications of the current findings are plentiful. In the realm of investing, for example, consumers will be more inclined to postpone current consumption to save for all manner of future events, such as vacations, college tuition, and retirement, if the time period during which the consumer must sacrifice is expressed in terms of dates than in terms of extent. Similarly, consumers will find investment plans that chart future expected gains more enticing if

the time until those gains is discussed in terms of dates. The implications extend beyond Wall Street, however. Consumers deciding whether to purchase energy efficient appliances may be more receptive to buying a more expensive appliance in order to reap future energy savings if the promotional material highlights the date by which the savings will offset the initial extra outlay, rather than the amount of time a consumer must wait to break even. Conversely, those deciding whether to finance a purchase will be happier with the financing arrangements if the amount of time by which the payment is delayed is expressed in extent. Essentially, in any manner of intertemporal decision—ranging from whether to pay extra for quick service to whether to forego immediate earnings to earn a college degree—consumer preferences may be starkly affected by how the time interval in question is described.

Consumers clearly know that time intervals can be represented in a variety of ways and that the particular descriptions used are immaterial to the situation's objective parameters. And yet, throughout this paper, time intervals described in terms of extent, instead of dates, prompted behavior that was more present-focused, in that it implied a greater disregard for future debts and gains. Thus, despite the objective equivalence of the two types of descriptions, consumers are affected by the disparate perceptions that each evokes. Much as in classic framing effects, in which a situation can be described as entailing gains or losses, thus provoking disparate risk attitudes and choices (Tversky and Kahneman 1981), different interval descriptions can provoke different perceptions and intuitions about how long an interval—and how severe a wait—will be. Lacking easily employed mechanisms for computing the relative merits of intertemporal tradeoffs, consumers must often rely on those intuitions and perceptions to decide how to equate time and money. As such, one may often observe malleability of consumer intertemporal preferences, as consumers present shifting opinions of whether something is worth waiting for.

Appendix

SCENARIOS USED IN EXPERIMENT 5

IRS:

Imagine that you get a letter from the Internal Revenue Service (IRS) stating that, because you made a math error on last year's tax return, you now owe $100 in taxes. They offer you the following deal: You can either pay the $100 now, or you can (*wait eight months / wait until December 22, 2003*) to pay the taxes. However, if you (*wait eight months / wait until December 22*), you will have to pay more than $100 when the taxes then are due. What is the most you would be willing to pay (*in eight months / on December 22, 2003*) in order to avoid having to pay the taxes right now? (This amount should be greater than the $100 you would pay if you paid today.)

PARKING: EXTENT

Imagine that you get a notice from the City of Gainesville about several parking tickets that you have not yet paid. The notice informs you that you currently owe $300 to the City, but it offers you the following deal: You can either pay the $300 now, or you can (*wait five months/ wait until September 22, 2003)* to pay the tickets. However, if you (*wait five months/ wait until September 22*), you will have to pay more than $300 when the time is up. What is the most you would be willing to pay (*in five months/ on September 22, 2003*) in order to avoid having to pay for the tickets right now? (This amount should be greater than the $300 you would pay if you paid today.)

CREDIT: EXTENT

Imagine that you have moved, and you need to buy several appliances as well as a sofa. You find all of these items at a home warehouse, and your total bill is $1200. The store offers you the following deal: You can either pay the $1200 now, or you can (*wait thirteen months/ wait until May 22, 2004*) to pay the bill. However, if you (*wait thirteen months/ until May 22*), you will have to pay more than $1200 to pay off the bill. What is the most you would be willing to pay (*in thirteen months/ on May 22, 2004*) in order to avoid having to pay the total bill right now? (This amount should be greater than the $1200 you would pay if you paid today.)

TABLE 1

AVERAGE COMPENSATION DEMANDED FOR WAITING, EXPERIMENTS 1A AND 1B

		Compensation demanded ($)	
Starting amount	Waiting time	Extent-format interval	Date-format interval
Experiment 1A			
$50	5 months	403.81	117.14
$100	8 months	756.19	222.38
$500	2 months	869.05	624.00
	Average	676.35	324.33
Experiment 1B			
$50	3 months	100.15	90.97
$100	8 months	287.48	207.07
$500	10 months	1308.40	825.32
$600	4 months	1162.81	856.27
	Average	746.21	517.08

TABLE 2

AVERAGE TIME WILLING TO WAIT, EXPERIMENT 2

Smaller immediate amount	Larger future amount	Interval length generated (days)	
		Extent-based response	Date-based response
$50	$260	579.28	852.37
$100	$490	733.39	1316.15
$500	$750	305.18	876.18
	Average	541.58	1024.71

TABLE 3

AMOUNT DESIRED AT CD MATURITY, EXPERIMENT 3

		Amount desired ($)	
Starting amount	Waiting time	Extent-format interval	Date-format interval
$50	11 months	170.87 $_{a}$	158.92 $_{a}$
$100	9 months	261.29 $_{a}$	206.89 $_{b}$
$400	16 months	773.48 $_{a}$	636.35 $_{b}$
$650	2 months	757.99 $_{a}$	758.79 $_{a}$
$500	8 months	712.82 $_{a}$	675.56 $_{a}$
$900	18 months	1465.76 $_{a}$	1284.53 $_{b}$
	Average	691.63 $_{a}$	617.15 $_{b}$

Within a row, means with different subscripts are reliably different (via an independent-samples t-test) with $p < .01$.

TABLE 4

PERCENTAGE CHOOSING THE LARGER LONG-TERM INVESTMENT OVER THE SMALLER SHORT-TERM INVESTMENT, EXPERIMENT 4

Initial investment	Short-term option	Long-term option	Percent preferring long-term investment (%)	
			Extent-format interval	Date-format interval
$125	$150, 4 mos.	$165, 6 mos.	47.0_a	67.2_b
$200	$280, 8 mos.	$400, 16 mos.	66.7_a	83.6_b
$350	$425, 14 mos.	$485, 23 mos.	24.2_a	35.8_a
$550	$600, 3 mos.	$655, 6 mos.	60.6_a	79.1_b
$600	$640, 2 mos.	$710, 5 mos.	77.3_a	85.1_a
$720	$800, 11 mos.	$815, 13 mos.	28.8_a	46.3_b

Within a row, means with different subscripts are reliably different (via a chi-square test) with $p < .05$.

TABLE 5

PERCENTAGE CHOOSING THE LARGER LONG-TERM INVESTMENT OVER THE SMALLER SHORT-TERM INVESTMENT, EXPERIMENT 6

	Percent preferring long-term investment (%)		
Initial investment	Day-format interval	Month-format interval	Date-format interval
$125	50.0	54.5	91.7
$200	58.3	63.6	83.3
$350	41.7	18.2	50.0
$550	50.0	45.5	83.3
$600	50.0	54.5	91.7
$720	41.7	9.1	41.7

The parameters of the investments are the same as those presented in Table 5.

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